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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/761,594 | 01/16/2001 | Hans-Jurgen Hacke | GR 98 P 4137 P | 5815 |

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EXAMINER

HARAN, JOHN T

ART UNIT

PAPER NUMBER

1733

9

DATE MAILED: 04/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/761,594

Applicant(s)

HACKE ET AL.

Examiner

John T. Haran

Art Unit

1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 9-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-8 in Paper No. 8 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear if in claims 1 and 3, the adhesive is supposed to be in a cylinder shape before it is introduced into the opening or if the adhesive obtains a cylinder shape after be introduced into the opening by conforming to the shape of the opening.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akagawa et al (EP 734,059) in view of Farnworth et al (U.S. Patent 6,639,600) and IBM Technical Bulletin, "Solder Plated Resin Ball" pages 463-464.

Akagawa et al are directed to a chip sized semiconductor device and a process for making it comprising providing chips (32), placing electrical connection pads on the chip (36), applying a first insulating layer (38) such that the electrical connection pads are left partially uncovered, producing interconnects (40) on the first insulating film leading from the electrical connection pads (36) to a base region (43) of external connection elements; applying a second insulating layer (42) on the interconnects and the first insulating layer that is thicker than the first insulating layer; forming openings (44) in the second insulation layer above the base regions; and placing solder balls (46) in the openings and attaching them to the base regions. Akagawa et al are silent towards the balls being plastic balls having a metallic coating.

It is well known and conventional in the semiconductor art to use plastic balls having a metallic coating and an outer solder coating in place of pure solder balls because the plastic is more reliable to withstand thermal stress, as shown for example in IBM Technical Bulletin, "Solder Plated Resin Ball" page 463. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the resin ball of the IBM Technical Bulletin in the method and product of Akagawa et al in order to increase resistance to thermal stress.

Akagawa et al are also silent towards bonding the balls to the base region by placing conductive adhesive in the opening, placing the ball on the adhesive and curing the adhesive. Akagawa et al teach bonding the solder ball to the base region through a reflow process (Column 9, line 3). It is well known and conventional to use conductive adhesive to bond balls to a surface in place of a reflow process, as shown for example in Farnworth et al (Column 11, lines 61-64). The two are alternative expedients and it would have been obvious to use either and only the expected results would be achieved. One skilled in the art would have readily appreciated that the opening in the second insulation layer of Akagawa et al is circular in shape to accommodate the ball and that adhesive placed in the opening would assume a cylindrical shape. It would have been obvious to one of ordinary skill in the art at the time the invention was made to place conductive adhesive in the opening and thereby assume a cylindrical shape, place a resin ball coated with metal on the conductive adhesive, and cure the adhesive in the method and product of the Akagawa et al.

Regarding claim 2, one skilled in the art would have readily appreciated that the thickness of the second insulation layer is within the purview of one skilled in the art. It would have been obvious to have the second insulation layer be four times thicker than the first insulation layer if so desired.

Regarding claims 4 and 7, it is well known and conventional to using a doctor blade for introducing conductive adhesive into openings. It would have been obvious to use conventional means for introducing the adhesive into the openings in the method of Akagawa et al, as modified above.

Regarding claims 5 and 8, Akagawa et al teach forming the chips on a wafer and dicing the wafer after the assembly process is complete (Column 9, lines 48-57).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Akram et al (U.S. Patent 6,114,240) and Farnworth et al (U.S. Patent 6,180,504) are not available as references, but are cited of interest for illustrating placing conductive adhesive in a hole and using it to bond a ball.

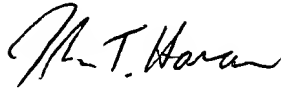
Weber (U.S. Patent 5,929,522) and Call et al (U.S. Patent 6,297,559) also teach bonding balls to a surface using conductive adhesive.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(703) 305-0052**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael W. Ball can be reached on (703) 308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.


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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



John T. Haran

April 17, 2002



Michael W. Ball
Supervisory Patent Examiner
Technology Center 1700